ROPS and FOPS – Status of ATD approved suppliers and ROPS/FOPS products

Revision 6
December 2009

CONTENTS **PAGE**

1 REFERENCES 1

2 AFRS AND AFRG SUMMARY IRO ROPS FOR LIGHT VEHICLES 2

3 STANDARD AND HEAVY DUTY ROPS 3

4 AFRS AND AFRG SUMMARY IRO ROPS FOR SURFACE MOBILE EQUIPMENT 3

5 LARGE BUSSES (FALL UNDER SME) 4

6 AFRS AND AFRG SUMMARY IRO ROPS AND FOPS FOR UNDERGROUND VEHICLES 4

7 LDVS: STANDARD DUTY ROPS 5

8 LDVS: HEAVY DUTY ROPS 6

9 SUVS: STANDARD DUTY ROPS 8

10 MINI-BUSSES: HEAVY DUTY ROPS 8

11 PERSONNEL CARRIER ROPS 9

12 SUV'S THAT DO NOT REQUIRE ROPS 10

13 SURFACE MOBILE EQUIPMENT ROPS 11

14 SUPPLIERS 12

15 VEHICLES FOR WHICH ROPS SOLUTIONS ARE REQUIRED (AUGUST 2009) 15

1 REFERENCES

- Anglo Fatal Risk Standard AA AFRS 1 Light Vehicles
- Anglo Fatal Risk Guideline AA AFRG 1 Light Vehicles
- Anglo Fatal Risk Standard AA AFRS 2 Surface Mobile Equipment
- Anglo Fatal Risk Guideline AA AFRG 2 Surface Mobile Equipment
- Anglo Fatal Risk Standard AA AFRS 10 Underground Equipment (Currently in draft)
- Anglo Fatal Risk Guideline AA AFRG 10 Underground Equipment (Currently in draft)
- Anglo Specification 264073 Roll-over Protective Structures and Falling-object Protective Structures for Trackless Vehicles

2 AFRS AND AFRG SUMMARY IRO ROPS FOR LIGHT VEHICLES

<table>
<tr><td colspan="4">AA AFRS 1 Standard: Requirements</td></tr>
<tr><td colspan="2">Definition of light vehicle
• 4 + wheels
• Not more than 12 passengers including driver
• Licensed for public road usage
• Including AA owned, hired, contractor, private
• Used for work related purpose</td><td colspan="2">Examples
• Passenger cars
• 4WD
• SUVs
• Pick-ups
• Mini-busses</td></tr>
<tr><td colspan="4">AA AFRG 1 Guideline: Requirements:
Vehicles to be driven on dirt or steep roads shall have ROPS</td></tr>
<tr><td rowspan="3">Background and Intent</td><td colspan="3">Risk of fatalities or injury related to vehicle accidents is high (see numbers). 20% of fatalities and serious injuries during vehicle accidents are related to roll-overs. ROPS is intended to reduce this risk. All light vehicles will have some risk of roll-over due to road conditions (eg dirt road), rolling down slope (eg steep road), but also due to high speed accidents, accidents with other vehicles etc. Vehicles cabins already are ROPS to OEM standards but are generally inadequate. The main intent of the guideline is to address the requirement for additional ROPS over and above the cabin structure.</td></tr>
<tr><td colspan="2">Typical Fatal Injury Frequency Rate due to vehicle accidents (international)</td><td>0.1 fatalities per 200 000 manhours driving</td></tr>
<tr><td colspan="2">Typical overall Fatal Injury Frequency Rate for Anglo American</td><td>0.02 fatalities per 200 000 manhours</td></tr>
<tr><td>Vehicle categories</td><td>Category A</td><td>Category B</td><td>Category C</td></tr>
<tr><td>Definitions</td><td>Vehicles not accessing operational areas</td><td>Vehicles accessing operational areas but do not interact with SME with rim size more than 25 inch</td><td>Vehicle accessing operational areas and interact with SME with rim size more than 25 inch</td></tr>
<tr><td rowspan="2">Requirement for additional ROPS according to the Guideline</td><td colspan="2">The requirement for additional ROPS for Category A and B vehicles is to be established based on specific risk assessment. Consideration should be ensured during the risk assessment of conditions such as off-road operation, frequent driving on badly maintained or dirt roads, steep and/or winding roads, high centre of gravity (e.g. pick-up trucks, light trucks used to transport heavy equipment), or generally accident prone routes or drivers. Additional ROPS shall be mandatory for any company owned vehicle that is frequently exposed to any of the above mentioned conditions. It is not intended that additional ROPS would be applied to light vehicles other than light commercial vehicles such as pick-up trucks, minibuses and light trucks. This then implies that sedan vehicles should not be employed where and when any of the above risk factors are prevalent.</td><td>Additional ROPS shall be mandatory for Category C vehicles (whether company owned or not), motivated by the fact that operational areas which include interaction with SME will mostly imply risk factors such as dirt roads, steep slopes, possible badly maintained roads, or off-road usage, etc.</td></tr>
<tr><td colspan="3">The Guideline differentiates between two tiers of additional ROPS, namely Standard ROPS and Heavy Duty ROPS. The decision of which tier of additional ROPS shall be required for Category C vehicles, as well as Category A and B vehicles determined to require additional ROPS, shall be based on a specific risk assessment.</td></tr>
</table>

3 STANDARD AND HEAVY DUTY ROPS

Standard and Heavy Duty ROPS apply only to light commercial vehicles including LDVs, SUVs and Mini-Busses. It does not apply to the strength requirements for tractors, large busses etc, which need to comply with existing specifications that apply specifically to these types of vehicles.

STANDARD TIER DUTY:
For normal opencast conditions (well maintained haul roads, speed regulations, berms etc.), the additional ROPS shall be designed and tested according to the requirements of AA specification 264073, which invokes the standard ISO 3471 or equivalent. This ISO standard is strictly speaking not applicable to light vehicles but is adapted for this purpose in the specification. The standard tier is intended to apply when the risk of accidents involving more than one roll-over of the vehicle is low, and where the driving conditions for Heavy Duty Tier ROPS do not pertain.
Note: This implies that travel on good roads at 120 km/hr is acceptable in vehicles fitted with Standard Tier ROPS subject to a risk assessment of the conditions.
Note: The risk of an accident involving more than one roll-over is always less than the risk of more than one roll-over in an accident. (The former includes the risk of the accident in the first place, whereas the latter does not).

HEAVY TIER DUTY:
In cases where the risks of accidents involving multiple roll-overs are high, additional ROPS structures that provide higher levels of protection than achieved by ISO 3471 standard should be used. Examples of these high risk situations include mountain passes, long distance travel on unpaved or poorly maintained off-site roads. Heavy duty ROPS must be designed and tested as prescribed in AA SPEC 264073.

4 AFRS AND AFRG SUMMARY IRO ROPS FOR SURFACE MOBILE EQUIPMENT

AA AFRS 2 Standard: Requirements	
Vehicles covered: • Rear dump trucks • Belly dump trucks • Water trucks • Graders • Dozers • Loaders • Pressurised road and rail tankers Approved or certified ROPS required unless exempted by Risk Assessment.	Examples of vehicles excluded: • Draglines • Shovels • Excavators • Forklifts • Mobile cranes • Buses • Backhoes • Bobcats • Trucks larger than light vehicles ROPS required if determined by Risk Assessment.
AA AFRG 2 Guideline: Requirements:	
Background and Intent	The intent of this requirement is to avoid serious injury/fatality by protecting the operator and other occupants of SME in the event of roll over accident with an appropriate Roll-Over Protection Structure (ROPS). The requirements apply to all SME on Anglo sites and include contractor vehicles.

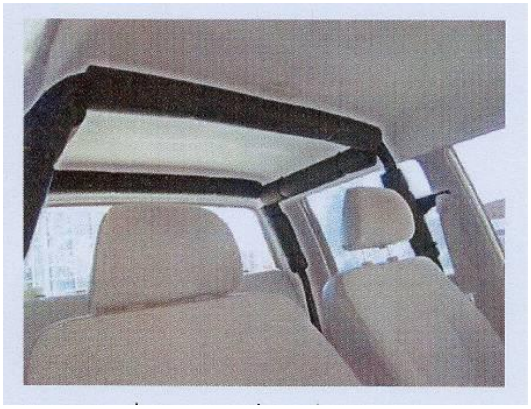
5 LARGE BUSSES (FALL UNDER SME)

Falls under AA AFRS 2 and AFRG 2 Surface Mobile Equipment (see above)
Large busses are defined as 18 or more seats (including driver), for which there are international ROPS specifications. The requirements for the strength of large passenger vehicle superstructures (roll- over protection) are legislated in many countries, including South Africa. In South Africa this is SANS 1563. ROPS (normally inherent in the bus superstructure design) are required by Anglo Specification 264073 *Roll-over Protective Structures and Falling-object Protective Structures for Trackless Vehicles,* which requires that they shall be designed, tested and certified according to the provisions of SANS 1563 (in South Africa). A bus cab built in South Africa would normally have integrated reinforcing hoops to meet SANS 1563. The bus should have documentation or a fixed label showing that it complies with SANS 1563. If not then the bus probably does not comply with South African legislation. DUYs have a preliminary design for installing reinforcing hoops into existing buses.

6 AFRS AND AFRG SUMMARY IRO ROPS AND FOPS FOR <u>UNDERGROUND VEHICLES</u>

AA AFRS 10 and AA AFRG 10: ROPS and FOPS for underground vehicles are controlled by the Anglo Fatal Risk Standard and Anglo Fatal Risk Guideline for Underground Equipment. (Currently in draft and unpublished).		
ROPS	The Standard and Guideline do not call for ROPS.	ROPS may be fitted based on a risk assessment decision.
FOPS	FOPS protection only required for vehicles that enter the immediate rock face.	FOPS protection only required on equipment such as drill rigs, roof-bolters, LHD's etc – i.e. heavy underground mining equipment that would be exposed to unsecured ground. Excludes light vehicles. Light vehicles only permitted in haulage ways and outbye areas.

7 LDVs: STANDARD DUTY ROPS

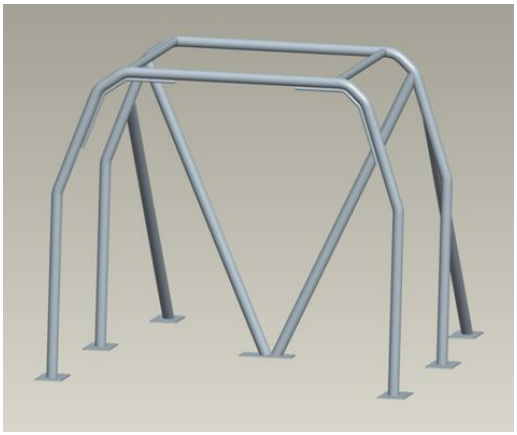
Falls under AA AFRS 1 and AFRG 1 Light Vehicles		
Option 1 Approved by ATD.	**External ROPS for single cab vehicles.** Less than 100 kg. Manufactured by DUYS SA. Australian design. Can be adapted for various single cab vehicles.	
Option 2 Approved by ATD.	**Internal ROPS for double cab vehicles.** Manufactured and designed by DUYS SA. ATD approved for: 1. Toyota Hilux DC Will be adapted for various double cab vehicles (not yet ATD approved): 1. Nissan Hardbody DC 2. Nissan Navara DC 3. Isuzu DC 4. Mahindra Scorpio DC 5. Mahindra Bolero DC	Picture not yet available
Option 3 Approved by ATD.	**Internal ROPS for double cab vehicles.** Global Fleet Sales (GFS). GFS are agents for Brown Davis ROPS. Manufactured by Brown Davis. Australian design & manufacture. A range of internal ROPS available for various double cab vehicles, see website for the range available. ATD approved for: 1. Ford Ranger Double Cab. 2. Toyota Hilux Double Cab. 3. Nissan Navara Double Cab. 4. Mitsubishi Triton Double Cab.	

8 LDVs: HEAVY DUTY ROPS

Falls under AA AFRS 1 and AFRG 1 Light Vehicles		
Option 1 Approved by ATD.	**External ROPS for single cab vehicles, and some double cabs.** Manufactured by DUYS SA. Australian design. Available in two forms: 1. Bin liner. Approx 190 kg. 2. Drop-side. OEM bin replaced with DUYS drop-side bin+ROPS. (Note: Although DUYS refer to this as a drop-side type they can make the load bin without drop sides if required). NOTE: Due to new developments the total mass of the ROPS + replacement bin is now < OEM bin. Result: Increase in payload achieved. Also, the combined replacement bin + ROPS can be transferred (if not damaged) when replacing the vehicle.	
Option 2 Approved by ATD	**External ROPS for gull wing toolbox on single cab vehicles.** Manufactured by DUYS SA. Australian design. Can be adapted for various single cab vehicles.	
Option 3 Approved by ATD	**External ROPS for gull wing toolbox on single cab vehicles.** Manufactured by Marvern Equipment SA. South African design. Can be adapted for various single cab vehicles	

Option 4 Approved by ATD	**Internal ROPS for single cab vehicles.** Global Fleet Sales (GFS). GFS are agents for Brown Davis ROPS. Manufactured by Brown Davis. Australian design & manufacture. Currently available for: Ford Ranger. Toyota Hilux. 	

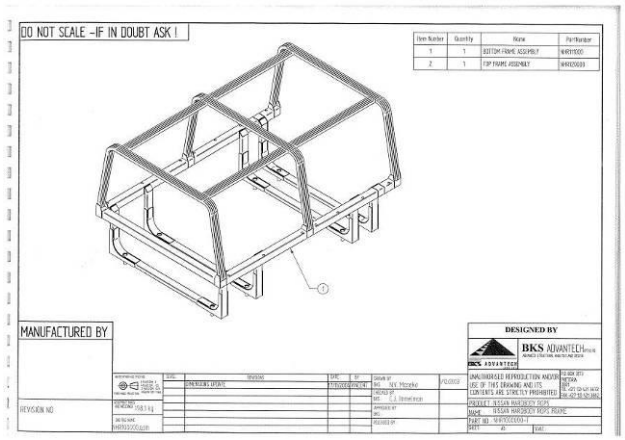
9 SUVs: STANDARD DUTY ROPS

Falls under AA AFRS 1 and AFRG 1 Light Vehicles		
Option 1 Approved by ATD.	**Internal ROPS for SUVs.** Manufactured and designed by DUYS SA. Australian DvExperts approved. ATD approved for: 1. Toyota Condor Will be adapted for various other SUVs (not yet ATD approved): 1. Toyota Avanza 2. Toyota Ventura 3. Toyota Fortuner 4. Mahindra Scorpio 5. KIA Pregio 6. KIA Sportage	

10 MINI-BUSSES: HEAVY DUTY ROPS

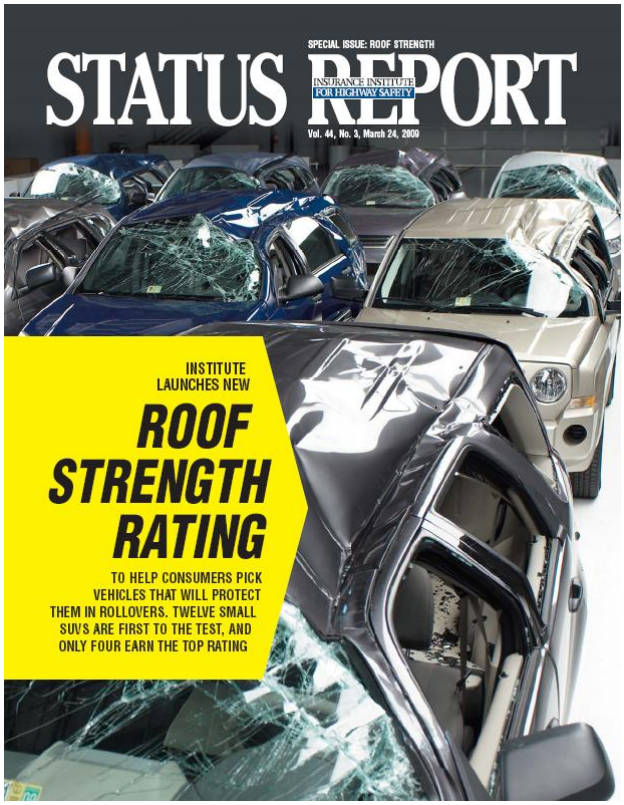
Falls under AA AFRS 1 and AFRG 1 Light Vehicles for vehicles up to 12 seats (incl driver). **Falls under AA AFRS 2 and AFRG 2 Surface Mobile Equipment** for vehicles over 12 seats (incl driver). Large busses are defined as 18 or more seats (incl driver), for which there are international ROPS specs.		
Option 1 Approved by ATD.	**Internal ROPS for SUVs.** Manufactured and designed by DUYS SA. ATD approved for: 1. Toyota Quantum 10 or 14 seater Will be adapted for various mini-busses (not yet ATD approved): 1. Mercedes Vito 2. Mercedes Sprinter 3. ERF hawk 4. VW Transporter 5. VW Caravelle	 Toyota Quantum

11 PERSONNEL CARRIER ROPS

Option 1 Approved by ATD.	External ROPS. Manufactured by DUYS SA. Can be adapted for various single cab vehicles.	
Option 2 Approved by ATD	External ROPS. Manufactured by DUYS SA. Can be adapted for various single cab vehicles.	
Option 3 Approved by ATD	External ROPS/FOPS for mounting on vehicle loadbox. Manufactured by Truckline Services. Can be adapted for various single cab vehicles.	
Option 4 Approved by ATD	External ROPS/FOPS for mounting on vehicle chassis. Manufactured by Waypoint. Can be adapted for various single cab vehicles?	Picture requested

12 SUV'S THAT DO NOT REQUIRE ROPS

The American Insurance Institute for Highway Safety has conducted roof crush tests on a number of SUVs.

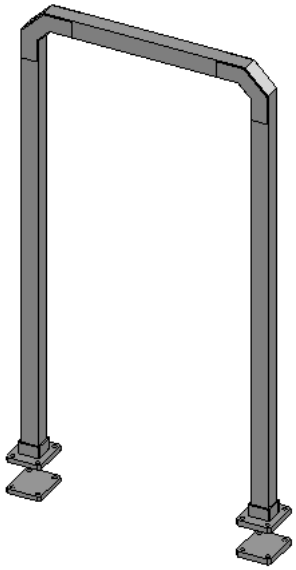
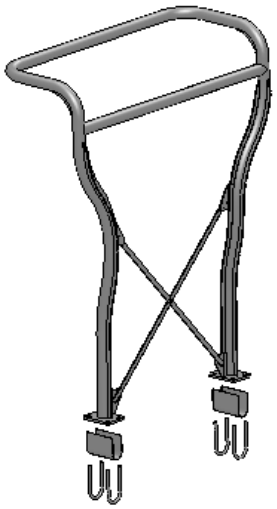

SPECIAL ISSUE: ROOF STRENGTH
STATUS REPORT
INSURANCE INSTITUTE FOR HIGHWAY SAFETY
Vol. 44, No. 3, March 24, 2009
INSTITUTE LAUNCHES NEW
ROOF STRENGTH RATING
TO HELP CONSUMERS PICK VEHICLES THAT WILL PROTECT THEM IN ROLLOVERS. TWELVE SMALL SUVS ARE FIRST TO THE TEST, AND ONLY FOUR EARN THE TOP RATING

Based on the data in this report the following SUVs do not need ROPS.
Some of the vehicles may not be available in all countries, or may be marketed under a different name. The roof strength ratio is the ratio of the force required to crush the roof by 125 mm divided by the Gross Vehicle Mass.

List of SUV's that do not require ROPS:

SUVs		Roof Crush Rating	Roof strength ratio to GVM
Option 1	Honda Element	Good	> 4
Option 2	Jeep Patriot	Good	> 4
Option 3	Subaru Forester	Good	> 4
Option 4	Volkswagen Tiguan	Good	> 4
Option 5	Chev Equinox	Acceptable	> 3.25
Option 6	Nissan Rogue	Acceptable	> 3.25
Option 7	Mitsubishi Outlander	Acceptable	> 3.25
Option 8	Suzuki Grand Vitara	Acceptable	> 3.25
Option 9	Toyota RAV4	Acceptable	> 3.25

13 SURFACE MOBILE EQUIPMENT ROPS

Falls under AA AFRS 2 and AFRG 2 Surface Mobile Equipment			
Option 1 Approved by ATD.	ATD design. Can be manufactured locally by any supplier meeting Anglo QC requirements. Coalseam manaufactured the test ROPS and have manufactured for Anglo Coal tractors. Available for tractors from 2000 to 5600 kg mass. Design and testing can be done for heavier tractors.		
Option 2 Approved by ATD	ATD design done for Eyesizwe Coal for Yamaha U-Max Model G28A. Approved by ATD. Can be manufactured locally by any supplier meeting Anglo QC requirements. Coalseam manaufactured the test ROPS Design and testing can be done for other models.		

14 SUPPLIERS

Suppliers with approved ROPS/FOPS for light vehicles

GLOBAL FLEET SALES (GFS)
Web: www.globalfleetsales.net

Contact for Africa, including South Africa:
Louis Celetana
Key Accounts Manager
Tel: +27 (0) 86 100 0758 ext 208
Cell: +27 (0) 83 655 6013
Fax: +27 (0) 86 537 7595
E-mail: louis.celetana@rmagroup.net

Contact outside of Africa:
Either Brown Davis or GFS
who will co-ordinate supply and fitting
Brown Davis:
Ph: +61 (3) 9762 8722 (Australia)
Fax: +61 (3) 9762 9829 (Australia)
dbrown@browndavis.com.au
or
Global Fleet Sales:
www.globalfleetsales.net
"(NOTE: GFSare currently rebranding as the RMA group)
Find the local GFS/RMA contact via their website.

Global Fleet Sales represent Brown Davis in Africa.
Brown Davis (Australia) design and manufacture ROPS.
Global Fleet Sales will procure Brown Davis designed ROPS and fit them the vehicles. Alternatively Brown Davis can fit the ROPS depending on location.

Brown Davis ROPS and other accessories can be viewed on www.browndavis.com.au

Products:
Various internal ROPS available (and other products)

DUYS
Web: www.duys.co.za

Research and Development:
Steve Crocker (031) 713 1743, Cell 083 461 4302.
Steve.crocker@duys.co.za

Quotes and admin:
Mallisa Nunn (031) 713 1759
Mallisa.nunn@duys.co.za

Products:
Various external ROPS/FOPS available
Personnel carrier protective cages
Developing internal ROPS (not yet approved)

Marvern Equipment
Website: www.marven.co.za

Sales and Marketing:
Warren Cuyler
Tel: 011 421 4954
Cell: 079 88 77 333
E-mail: warren@marven.co.za

Products:
External ROPS/FOPS available

TRUCKLINE SERVICES

Contact:
Peter Freeme
Tel: +27 13 690 3440/2
Cell: 082 766 8041
Fax: +27 13 690 3441
E-mail: truckline@mweb.co.za

Products:
External ROPS/FOPS for mounting on vehicle chassis.

WAYPOINT

Contact:
Kobus Visser
Tel: +27 17 632 2219/0
Cell: 083 252 5900
Fax: +27 17 632 2131
E-mail: waypoint@mweb.co.za

Products:
External ROPS/FOPS for mounting on vehicle chassis.

15 VEHICLES FOR WHICH ROPS SOLUTIONS ARE REQUIRED (AUGUST 2009)

MAKE	MODEL	YEAR	MINE	No
LDVs				
Ford	Ranger 2.5 Single cab Blasting vehicle	2003	Kleinkopje	1
Ford	Ranger 2.5 Stretch cab Blasting vehicle	2006	Kleinkopje	1
Mazda	2.7 (Fire vehicle)	1990	Kleinkopje	1
Toyota	Land Cruiser. With ladder.	2007	Kleinkopje	1
VW	Transporter Double Cab LWB	?	Contactor DAS	1
SUVs				
KIA	Pregio	2006	New Denmark	1
KIA	Pregio	2005/6	Kleinkopje	2
KIA	Pregio	2006	Contactor	1
KIA	Sportage	2006	Kleinkopje	1
Mahindra	Scorpio	2005/6	Kleinkopje	3
Toyota	Condor	2000	New Denmark	1
Toyota	Condor	2004	New Denmark	1
Toyota	Condor	2003/4	Kleinkopje	3
Toyota	Venture	1999	New Denmark	1
Toyota	Venture	1992	Kleinkopje	2
Toyota	Avanza	2008	Contactor	1
Toyota	Avanza. Driver + 7	?	Mafube	1
VW	Caravelle	2004	New Denmark	1
Mercedes-Benz	?	?	Kriel	1
MINI-BUSSES. Less than 18 seats including driver.				
ERF BUS	Hawk	1998	New Denmark	2
Mercedes-Benz	Sprinter 308 CDi	?	Isibonelo	1
Mercedes-Benz	? See slides	?	Kriel Contractor Benicon	1
Mercedes-Benz	Vito 8 seater	?	Mogalakwena	1
Toyota	Qantum	2007	New Denmark	1
Toyota	Qantum	2007	Kleinkopje	2
Toyota	Qantum. Driver + 13	?	Mafube	1
Toyota	Qantum. Driver + 13	?	Mogalakwena	5
VW	? See slides	2008	Kriel Contractor Moolmans	1

LARGE BUSSES. **More than 18 seats including driver.**				
Iveco	Daily 18 seater	?	Mogalakwena	1
Iveco	Daily 23 seater	?	Mogalakwena	1
Mercedes-Benz	Sprinter 23 seater	?	Mogalakwena	3
Mitsubishi	? See slides	?	Kriel Contactor Benicon	1
Tata	30 Seater	2004	Contactor	1
Tata	32 Seater	?	Mafube	2
VW	? See slides 4.6 L Driver + 19	?	Isibonelo	1